7. Plants

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7-1 Water Howellia

7-1.1 Species Name

Howellia aquatilis

Common Name: Water howellia

Initial coverage recommendation: Covered

7-1.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Threatened (1994)

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Threatened

NATURAL HERITAGE PROGRAM GLOBAL RANK

G3

NATURAL HERITAGE PROGRAM STATE RANK

S2, S3

7-1.3 Range

Water howellia occurs in freshwater pothole ponds or abandoned river ox-bow sloughs in Washington, Idaho, Montana and California. The largest cluster of populations is found in the Swan River drainage in northwestern Montana, where there are approximately 138 known occurrences (Montana Natural Heritage Program 2005); almost 66 percent of the known populations of water howellia are in this area. There is one known occurrence in Idaho in northern Latah County (Idaho Fish and Game 2005). In California, there are five known occurrences, all in Mendocino County (CalFlora 2005). It had previously been recorded from at least four different places in northwestern Oregon, but is now thought to be extirpated from the state (US Fish and Wildlife 2005).

In Washington, there are over 60 occurrences of water howellia (US Fish and Wildlife 1996), with the majority in Spokane County and smaller clusters in Pierce and Clark counties. In Spokane County, it occurs in the forested portions of the channeled scablands. The Clark County sites are in the broad floodplain of the Columbia River, and the Pierce County populations are in the Douglas fir-dominated forests of the Puget trough lowlands, mainly on Fort Lewis (US Fish and Wildlife 1996).

7-1.4 Habitat Use

Water howellia is an annual, rooted, aquatic plant that is mostly submerged. It is restricted to small, vernal, freshwater wetlands (US Fish and Wildlife 1996). These wetlands normally fill with water in the fall and remain inundated through the spring and early summer, but then dry out by the end of the growing season. This dry period is critical for seed germination. The substrates supporting the Howellia are usually firm, consolidated clays and organic sediments.

Wetlands that support water howellia are typically located within the forested portion of a matrix of forested and non-forested communities (US Fish and Wildlife 1996), with conifers making up most of the trees in the surrounding forests. In western Washington, these are typically Douglas fir (*Pseudotsuga menziesii*); in Spokane County, they are Ponderosa pine (*Pinus ponderosa*); and in Idaho and Montana, they are a mixture of species. There are almost always broadleaf deciduous trees partially surrounding the supporting wetlands, including black cottonwood (*Populus trichocarpa*), quaking aspen (*P. tremuloides*) or Oregon ash (*Fraxinus latifolia*), and there is usually a well-developed shrub component, such as dogwood (*Cornus stolonifera*), snowberry (*Symphoricarpos albus*), or spirea (*Spiraea douglasii*) in the surrounding community (US Fish and Wildlife 1996).

Water howellia produces two types of flowers. Early cleistogamous flowers (flowers that are self-pollinating and do not open) that are small and remain submerged are produced in May and June. In July and August, flowers emerge above the surface. These latter flowers are open but apparently also are primarily self-pollinating (Lesica et al. 1988). Seed germination occurs in the fall in sediment where water has receded. The seeds require an aerobic environment and cool temperatures to germinate, and optimal germination occurs on peaty, coarse-textured sediment (Lesica 1992).

7-1.5 Population Trends

The overall population trend for water howellia appears to be stable (Caplow, Personal communication. March 18, 2005). Many of the known populations are on federal or protected lands, and its federal Threatened status provides regulatory protection on all federal lands where it occurs. In the year 2000, the Fort Lewis water howellia population was considered stable (Fort Lewis 2000).

7-1.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Threats to water howellia habitat include logging, drainage of aquatic habitat for urban and agricultural development, invasive noxious weeds (reed canarygrass [*Phalaris arundinacea*], purple loosestrife [*Lythrum salicaria*]), disturbance and trampling by livestock, and removal of native vegetation surrounding ponds (Center for Plant Conservation 2005). Timber harvest may affect wetland vegetation by increasing siltation of the wetlands as a result of runoff from the logging areas. In addition, removal of the tree canopy may increase runoff and decrease evapotransipration, which can prolong inundation (US Fish and Wildlife 1996). Livestock may affect populations primarily by trampling and physical disturbance, which can lead to increased invasion by weedy species. Invasive species, such as reed canarygrass, can crowd out species such as water howellia, and also can alter the rate of wetland succession, making the site less suitable for water howellia. Additional threats described by US Fish and Wildlife (1996) include noxious weeds on adjacent lands, conversion of habitat, road construction and maintenance and military training exercises.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There are no known threats related to over-utilization of this species (US Fish and Wildlife 1996).

DISEASE OR PREDATION

Disease and predation are not believed to be serious threats to water howellia. Livestock have not been observed to feed on water howellia, although some native animals might (US Fish and Wildlife 1996).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The Endangered Species Act (ESA) provides for protection of water howellia on all federal lands. Approximately two-thirds of all of the known occurrences of this species occur on federal property (US Fish and Wildlife 1996); therefore, ESA protection is likely to help prevent global extinction of the species. However, activities such as timber harvest on adjacent, nonfederal lands could have serious adverse impacts on the federally managed populations. The ESA provides no protection for listed plants on nonfederal lands.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Climate change and the species' low genetic diversity may pose a threat (Center for Plant Conservation 2005), although the plant has likely adapted to the range of changes and variation in its natural habitat. Human factors may accelerate these changes or increase the amplitude of these changes beyond the adaptive capability of the species (US Fish and Wildlife 1996). water howellia has a very narrow range of ecological requirements.

It is restricted to fairly specific substrates in portions of wetlands that are seasonally inundated, but the substrate must dry out enough to allow for seed germination. The species has very little genetic variation within or among populations (Lesica et al. 1988), which may greatly limit the species ability to adapt to environmental changes. Global climate change could result in altered hydrologic regimes across the range of the species, putting many of the populations at risk. Natural succession and fire are other factors affecting the survival of water howellia populations (US Fish and Wildlife 1996).

7-1.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Water howellia is likely to be affected by Washington DNR authorized activities. It is particularly susceptible to activities, such as the construction of roadways that would alter the shoreline of the ponds where the populations are located. Altered shorelines could enhance colonization by introduced species that can outcompete, or render the habitat unsuitable for, water howellia. Runoff from roads causes increases sedimentation and deposits fertilizer into wetlands causing increased eutrophication.

7-1.8 Species Coverage Recommendation and Justification

It is recommended that water howellia be addressed as a **Covered Species** for the following reasons: 1) It is currently a federally listed Threatened species; and 2) Washington DNR activities have a "medium" potential to affect water howellia . 3) Sufficient information is available to assess impacts and to develop conservation measures.

7-1.9 References

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7-2 Persistentsepal Yellowcress

7-2.1 Species Name

Rorippa columbiae

Common Name(s): Persistentsepal yellowcress, Columbia yellowcress

Initial coverage recommendation: Covered

7-2.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Species of Concern

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Endangered

NATURAL HERITAGE PROGRAM GLOBAL RANK

G3

NATURAL HERITAGE PROGRAM STATE RANK

S1, S2

7-2.3 Range

Persistentsepal yellowcress is endemic to Washington, Oregon and California. Within this overall range, populations are found in two widely separated regions: the shorelines of the Columbia River in Oregon and Washington, and in an assortment of habitats in south-central Oregon and California. (Washington DNR 2005).

Although the original range of the species was probably considerably larger in Washington than at present, major populations of Persistentsepal yellowcress is currently found in two specific reaches of the Columbia River. The largest population is found within the Hanford Reach in Benton, Franklin and Grant counties, and another significant population occurs in the vicinity of Pierce Island and Pierce National Wildlife Refuge approximately three miles downstream from Bonneville dam (Washington DNR 2005).

7-2.4 Habitat Use

The species is low-growing, with most stems either laying on the ground surface or rising slightly at the tips. It spreads via underground stems (rhizomes), and is perennial (Sauer and Leder 1985; Habegger et al. 2000; Simmons 2000). Along the Columbia River, the species' habitat consists of gently sloped cobble and graveled, silty shoreline beaches (Simmons 2000). It typically occurs in open areas with little competing vegetation along a thin band as the lowest elevation riparian zone (Washington DNR 2005). Construction of hydroelectric dams along the Columbia River has eliminated most of the species historical habitat (NatureServe 2005). The reservoirs have either permanently inundated the populations sites, or operation of the dams has altered the hydrologic regime. Under the natural hydrologic cycle of the Columbia River, spring floods would scour the portions of the shoreline used by Persistentsepal yellowcress, and remove much of the silt from the gravel or cobble matrix. This flooding and scouring probably also reduced the competitive environment.

In Washington, Persistentsepal yellowcress has been observed only along the Columbia River, but in Oregon and California, it has been found in intermittent streams, permanent and vernal lakes, wet meadows, and ditches. All known populations sites inundated during at least part of the year. Wet soil throughout the growing season is required for survival and reproduction. Populations have been found in nearly all soil types ranging from clays and sands to gravel and cobbles (Washington DNR 2005).

7-2.5 Population Trends

In the mid 1980's it was suggested that persistentsepal yellowcress was abundant in Washington (Sauer and Leder 1985). In the mid 1990's there were over a million persistentsepal yellowcress plants in approximately 30 populations throughout Washington, Oregon and California (NatureServe 2005). However, more recent field evidence (Habegger et al. 2000; Simmons 2000), coupled with an increased understanding of the general effects of the hydropower system on the species' growth, reproduction and habitat conditions, indicate that populations along the Columbia River likely are declining. Water levels in dammed river systems fluctuate daily in response to power demands and inundate the species earlier in the growing season than natural flow regimes do. Stem density and frequency declined from 1991 to 1998 in the Pierce Island population which has been attributed to the altered hydrodynamics of the Columbia River (Habegger et al. 2000). The frequent flooding associated with dams during the growing season was shown to reduce the species' growth (stem production) and flowering from 1994 to 1998 along the Hanford Reach, which is considered the species' most vigorous population (Simmons 2000). In addition, daily flooding tends to increase siltation, which promotes the colonization of other species that may grow and reproduce better under flooded conditions and thus outcompete persistentsepal yellowcress.

7-2.6 Assessment of Threats Warranting ESA Protection

Of the factors discussed below, water availability and hydrological conditions are certainly the most important, because persistentsepal yellowcress requires moist to wet soil (NatureServe 2005).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Habitat destruction is the most prevalent concern throughout the species range. Several populations that were discovered along the Columbia River in the late 1800s have been inundated behind dams, with numerous populations in Oregon documented in the late 1800s and early 1900s appearing to have disappeared. Agriculture or urbanization are likely responsible for the destruction of most of the Oregon populations. Other factors that have contributed to habitat loss include road-building, dredging, development, and recreation (NatureServe 2005).

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

Over-utilization has not been identified as being an issue for persistentsepal yellowcress (NatureServe 2005; Washington DNR 2005).

DISEASE OR PREDATION

Disease and predation have not been identified as being an issue for persistentsepal yellowcress (Washington DNR 2005; NatureServe 2005).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The adequacy of existing regulatory mechanisms has not been identified as an issue for persistentsepal yellowcress (Washington DNR 2005; NatureServe 2005). However, because the species does not have protection under the Endangered Species Act (ESA), decisions regarding the operation of the Columbia River dam system, such as how much water to release and when to release it, are made without regard to the potential impacts to this species.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Along the Columbia River in Washington and northern Oregon, river flows and water levels impact the growth and reproduction of persistentsepal yellowcress (Harbegger et al. 2000; Simmons 2000). Although the species appears to be adapted to occasional prolonged inundation (NatureServe 2005), the cumulative effects of frequent, short-term inundation during the growing season may depress its vigor (Harbegger et al. 2000; Simmons 2000) and may affect its long term reproduction (Washington DNR 2005).

At the south-central Oregon and northern California persistentsepal yellowcress sites, the hydrological cycle is controlled by meteorological trends is. There is a positive

correlation between the amount of precipitation, and the number of populations as well as the population size and individual plant vigor (NatureServe 2005).

Although cattle trampling is probably not a significant threat to Washington State populations, it (and potentially grazing) is considered a threat at the southern Oregon and California sites (NatureServe 2005).

In addition, persistentsepal yellowcress is usually found in areas with very little other vegetation, and it appears that it is a poor competitor. Because the species is low growing, other plants readily shade it. In addition, because water is, competing plant species may reduce available water resources that are necessary for successful growth and reproduction. Therefore, interspecific competition may be an important indirect threat, particularly if invasion by weedy species is exacerbated by artificial hydrological cycles or other factors such as cattle grazing (NatureServe 2005). Woody vegetation encroachment has been identified as being of particular concern (Washington DNR 2005).

7-2.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Persistentsepal yellowcress is likely to be affected by some activities authorized on state-owned aquatic lands. Habitat destruction is the main concern for the species. Activities that may cause habitat loss, such as roadways, bridges, docks, marina construction and operation and dredging may adversely affect the species. Increased siltation from dredging, construction, and turbulence from watercraft frequenting marinas and docks may allow other species to outcompete persistentsepal yellowcress. Turbulence from boats may also increase bank erosion, reducing habitat.

7-2.8 Species Coverage Recommendation and Justification

It is recommended that the persistentsepal yellowcress be considered as an **Evaluation Species** because: 1) Persistentsepal yellowcress is considered a Federal Species of Concern and is considered Endangered in Washington State (Washington DNR 2004); 2) Washington DNR activities have a "medium" potential to affect persistentsepal yellowcress; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

7-2.9 References

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7-3 Water Lobelia

7-3.1 Species Name

Lobelia dortmanna

Common Name: Water lobelia

Initial Coverage Recommendation: Covered

7-3.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Threatened

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S2, S3

7-3.3 Range

Water lobelia occurs throughout the northeastern United States, the northern Midwest, across Canada and south into Washington and Oregon (NatureServe 2005), as well as throughout northern Europe, Scandinavia and Scotland. In British Columbia, most of the populations are found on Vancouver Island and the southwestern part of the mainland, with a few populations recorded in central British Columbia and the Queen Charlotte Islands (Klinkenberg 2004). In Oregon, it occurs in the eastern Cascade Mountains in Jefferson and possibly Deschutes counties (Oregon Natural Heritage Program 2004; Oregon Vascular Plant Database 2005). In Washington, water lobelia is found in the northwestern part of the state, with known populations in King, Skagit, San Juan, Clallam and Mason counties and historical populations in Snohomish and Whatcom counties (Washington DNR 2005).

7-3.4 Habitat Use

Several morphological and physiological features are important in understanding the habitat requirements of water lobelia and the threats that various environmental impacts may have on this species. Water lobelia belongs to the isoetid group of aquatic plants, a morphological / functional group that includes species from vastly different taxonomic groups (for example, *Isoetes*, a primitive fern ally, *Litorella uniflora* [Plantaginaceae] and *L. dortmanna* [Campanulaceae]). Isoetids are characterized by thick, stiff leaves that form basal rosettes, with a relatively high proportion of below-ground biomass and large air passages, or lacunae, that connect the leaves with the tips of the roots. While most aquatic plants obtain carbon dioxide and nutrients from the water, almost all isoetid gas exchange and nutrient uptake occurs between the roots and the sediment (Smolders et al. 2002). In fact, Pedersen and Sand-Jensen (1992) found that even when the leafy rosette water lobelia is exposed to air, virtually the entire carbon-dioxide uptake is still through the roots. Isoetid plants have a high rate of radial oxygen loss from the roots, which in turn, can significantly alter the oxidation-reduction potential of the sediment (Smolders et al. 2002) and enhance microbiological activity (Karjalainen et al. 2001).

Water lobelia is a perennial species that normally occurs in the shallow water along the margins of ponds and lakes (Hitchcock et al. 1959; Gleason and Cronquist 1991) in mineral sand (Smolders et al. 2002). Isoetids, such as water lobelia, are slow-growing plants that, at least in parts of Europe, can dominate in weakly buffered, nutrient-poor (oligotrophic) lakes and ponds. They also dominate in areas that have high oxidation-reduction potential in the sediment; relatively low alkalinity and high acidity of the water layer and the sediment pore water; low phosphate levels in the water and sediment pore water; and nitrate as the dominant nitrogen form (Smolders et al. 2002).

Water lobelia has several adaptations that allow it to thrive in nutrient-poor conditions. For example, it increases oligotrophic conditions in its environment by releasing oxygen from its roots, which creates a nitrification-denitrification system (Risgaard-Petersen and Jensen 1997) that reduces the availability of nitrogen and phosphate. In essence, the nutrient-poor conditions of the habitat are largely created and perpetuated by the plants themselves (Smolders et al. 2002), which greatly reduces the competition from faster growing species with greater nutrient requirements. Unlike most aquatic plants, water lobelia is able to form mycorrhizal associations that allow for increased phosphorus uptake in the nutrient-poor conditions (Brock-Nielsen and Madsen 2001).

7-3.5 Population Trends

Trends for the known populations in Washington are not well known, but are probably declining due to increased shoreline development near several of the populations (Caplow, Personal communication. March 18, 2005).

7-3.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Because this species is highly dependant on oligotrophic conditions, any alterations of water-quality factors, pH, or nutrient conditions could dramatically change the populations, or cause local extirpation of the species. Smolders et al. (2002) identified several threats to isoetid vegetation, including accumulation of organic matter, acidification and liming, increased nutrient levels in the water layer and epiphytic shading (which may result from increased nutrient availability). Therefore, factors such as fertilizer run-off, erosion and siltation, as well as acidic deposition could alter the self-maintained oligotrophic conditions within the water lobelia populations. Data summarized by Smolders et al. (2002) indicate that even relatively small changes in some of these parameters can lead to rapid population declines and community dominance shifts. The species also can be susceptible to physical alteration of the habitat via dredging or filling, and changes in the natural hydrologic regime.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There are no known threats related to over-utilization threats associated with this species.

DISEASE OR PREDATION

No specific disease or predation threats are known for this species.

ADEQUACY OF EXISTING REGULATORY MECHANISMS

There are currently few if any regulatory mechanisms protecting this species. It is not protected under the Federal Endangered Species Act (ESA), and because it is not considered globally rare, federal protection is not likely to be forthcoming. At least some of the existing sites are not protected by administrative measures, and development at several sites has threatened local populations.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

This species could be at risk from herbicides used to control water milfoil, shoreline development, pollution from boats and personal watercraft and trampling (Washington DNR 2005). Szmeja (1994) found that water lobelia individuals in shallower areas are more susceptible to damage by wave action than those in deeper areas. Therefore, activities that increase wave action such as bulkheading and boating could damage populations in shallow areas.

7-3.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Water lobelia is likely to be adversely affected by Washington DNR authorized activities. It is particularly susceptible to shoreline development, such as roads, bridges, docks and marinas, and any activity that could result in changes to the water-quality profile of the inhabited waters, such as run-off from roads and other overwater structures that increase the concentrations of concentrations of heavy metals, salts and petroleum products in the sediments and water column. Fertilizer run-off and increases in nutrients from septic and wastewater treatment systems may affect the species.

7-3.8 Species Coverage Recommendation and Justification

It is recommended that water lobelia be addressed as an **Evaluation Species** for the following reasons: 1) The species is not federally listed, but is considered by the State of Washington; 2) Washington DNR authorized activities have "high" potential to affect water lobelia; and 3) Insufficient information exists to assess impacts and to develop conservation measures.

7-3.9 References

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7-4 Pygmy Water-Lily

7-4.1 Species Name

Nymphaea tetragona

Common Name: Pygmy water-lily

Initial coverage recommendation: Covered

7-4.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Not listed

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

SH

7-4.3 Range

Nymphaea tertagona has been reported in only two locations within one small area in the contiguous United States - Whatcom County in extreme northwestern Washington. The species was collected by W.C. Muenscher in 1939 (Burke Museum 2005) and was also collected in 1966 (Caplow, Personal communication. March 18, 2005). Both of the previous collection locations are now dominated by *Phalaris arundinacea* and *N. tetragona* no longer exists at either site (Caplow, Personal communication. March 18, 2005). The species is now believed to be extirpated from both the State of Washington and the contiguous United States (Flora of North America Committee 1997; NatureServe 2005; Washington DNR 2005).

Although *N. tetragona* is distributed broadly over northwestern North America, it is not common anywhere in its New World range (Flora of North America Committee 1997). It is considered imperiled (S2) or critically imperiled (S1) in Canada (NatureServe 2005), where it occurs across central Manitoba and northern Saskatchewan, extreme northeast Alberta and in British Columbia (Flora of North American Committee 1997). In British Columbia, it is found at a few sites along the coast and in the central portion of the province (Klinkenberg 2004). It can also be found in south central Alaska (Flora of North America Committee 1997). The NatureServe (2005) database indicates that it is vulnerable (S3) in Alaska, but the Alaska Natural Heritage Program does not include it in its list of tracked plant species (ANHP 2004). The species is probably more common in Eurasia and is found in Finland, Russia, China and Japan (NatureServe 2005).

7-4.4 Habitat Use

Pygmy water-lily are similar to other water lilies in that it is a perennial aquatic plant, rooted in the underlying sediment, with elliptical, floating leaves and bowl-shaped flowers that float on the surface. The leaves are about 12 centimeters diameter and smaller than the more common *N. odorata* (up to 40 centimeters) (Flora of North America Committee 1997); with the flowers similarly smaller. The leaves have an individual lifespan of approximately 31 days (Kunii and Aramaki 1992), whereas the tuberous rhizomes persist for more than 5 years (Kunii 1993).

Pygmy water-lily occurs in ponds, lakes and quiet streams (Flora of North America Committee 1997) and has acclimated to both human- and beaver-created impoundments (NatureServe 2005). It flowers in summer.

7-4.5 Population Trends

The global population trend is probably stable. In Washington State, however, it is believed to be extirpated.

7-4.6 Species Coverage Recommendation and Justification

It is recommended that the pygmy water-lily be considered as a **Watch-list Species** because: 1) It is believed to have been extirpated from Washington.

7-4.7 References

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7-5 Kalm's or Brook Lobelia

7-5.1 Species Name

Lobelia kalmii

Common Name(s): Kalm's lobelia, brook lobelia

Initial coverage recommendation: Evaluation

7-5.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Endangered

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S1

7-5.3 Range

Kalm's lobelia occurs throughout the northeastern United States, much of Canada, and may occur in all of the states along the northern tier of the U.S. (NatureServe 2005). It is considered frequent in southeast and northern British Columbia, but infrequent in the south-central region (Klinkenberg 2004). Although it has not been confirmed to exist in either Idaho (Idaho Fish and Game 2005) or Oregon, in Washington it is known only from one extant site in northeastern Yakima County (Washington DNR 2005), with Hitchcock and Cronquist (1973) suggesting that it may also occur in northeastern Washington.

7-5.4 Habitat Use

In much of its range, lobelia habitat appears to be correlated with calcareous soils or limestone. The habitat of Kalm's lobelia is described as "calcareous shores and swamps" (Gleason and Cronquist 1991), "wet or springy places in limestone regions" (Newcomb 1977) and "wet to moist calcareous fens, shorelines and meadows in the montane zone" (Klinkenberg 2004). Hitchcock and Cronquist (1973) describe the habitat as marl or peat bogs along shores and in other wet places. The Yakima county population is located in a densely-vegetated perennial spring (Washington DNR 2005), where it co-occurs with several other taxa that are rare in Washington State. Although the site may not be strictly calcareous, it is likely that the soil and water are at least slightly alkaline.

Kalm's lobelia is a perennial species that will often occur at sites with standing water, such that the basal leaves are submerged while the upper leaves and flower are emergent. However, it can also occur at sites where there is little or no standing water (Washington DNR 2005). It flowers from July through August (Hitchcock et al. 1959).

7-5.5 Population Trends

Globally, Kalm's lobelia is considered to be secure and stable (G5). However, in North America it is considered imperiled (S1) in several states, mostly on the southern edge of the species range, including Washington State. The trend for the extant population in Washington is not known, because it has not been revisited since 1994 (Caplow, Personal communication. March 18, 2005).

7-5.6 Species Coverage Recommendation and Justification

It is recommended that Kalm's lobelia be addressed as a **Watch-list Species** because: 1) The species is not federally listed; 2) The only known population within Washington State is on land completely owned and managed by the U.S. Department of Defense and as a result Washington DNR activities have a "low" potential to affect Kalm's lobelia; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

7-5.7 References

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